

Schistosomiasis: An Updated Literature Review

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Abstract— *Schistosomiasis is a disease caused by flatworms of class Trematoda. These occur in various regions of the world, and in Brazil, the disease is responsible for the Schistosoma mansoni. This is the human species as definitive hosts, and freshwater snails of the genus Biomphalaria as intermediate hosts. The general objective of this study was to gather information on schistosomiasis, relating Etiology, evolutionary cycle, transmission, prevention and treatment. For this reason, literature reviews were carried out in books, articles, Google Scholar and the Ministry of Health. Schistosomiasis is an endemic disease that still persists in many areas due to lack of planning and public policy committed to the health of the population. It is concluded that schistosomiasis control depends on the combined actions of education of the population of affected areas, combating vectors, sanitation, among other measures.*

I. INTRODUCTION

Schistosomiasis mansoni is a globally relevant endemic disease, present in approximately 52 countries and territories, especially in regions of Africa, the Caribbean, South America, and the Eastern Mediterranean, reaching areas such as the Nile Delta and nations like Egypt and Sudan (MINISTRY OF HEALTH, 2005). In Brazil, transmission is established in 19 federative units, with a continuous strip from the coast of Rio Grande do Norte to Bahia, extending into the interior of Minas Gerais and Espírito Santo, and occurring in localized areas of the Central-West, North, and South (MINISTRY OF HEALTH, 2005). The states with the highest prevalence currently include Alagoas, Pernambuco, Sergipe, Bahia, Paraíba, Espírito Santo, and Minas Gerais (MINISTRY OF HEALTH, 2005).

Historically, the spread of schistosomiasis in Brazil was slow and gradual, associated with the slave trade, the expansion of the agricultural frontier (such as sugarcane in the Northeast, and rice and vegetables in the Southeast), low levels of basic sanitation, and the presence of the

transmitting mollusk (PEREIRA & TÁVORA, 1994). In terms of landscape, this disease thrives in fertile lands with abundant perennial water—especially lowlands and smaller water bodies—places conducive to the settlement of vulnerable populations (PEREIRA & TÁVORA, 1994). The process of human contamination occurs through the elimination of eggs in the feces of infected individuals in precarious sanitation conditions; subsequently, cercariae released by snails reach people through direct contact with contaminated water (DIAS, 1998). Despite the apparent simplicity of the cycle (human → water → snail → water → human), schistosomiasis is intertwined with social and environmental determinants that complicate its control.

In recent decades, Brazil has made progress in diagnosis, surveillance, and treatment, but a significant burden of cases, hospitalizations, and mortality persists. For example, between 2019 and 2023, 1,557 cases of schistosomiasis were reported in the state of Bahia, predominantly in the intestinal form, especially among men and individuals aged 40 to 59 years (EP -082, 2024)¹. Nationally, from 2019 to 2023, 13,575 cases were reported,

with a higher incidence in the Northeast and Southeast regions, particularly in the states of Bahia, Pernambuco, Minas Gerais, and Sergipe (OLIVEIRA et al., 2025). The prevalence remained below 2 cases per 100,000 inhabitants during this period, suggesting improvements in sanitary conditions, although it remains relevant as a public health problem (OLIVEIRA et al., 2025).

Recent studies have also explored new dimensions of schistosomiasis. In Eunápolis (BA), an integrated epidemiological, environmental, and malacological analysis—conducted between 2023 and 2024—identified the presence of fecal coliforms in water bodies used for leisure and recreation, in addition to the occurrence of mollusks of the genus *Biomphalaria*, highlighting latent environmental risk factors for the maintenance and reactivation of local transmission (LIMA et al., 2025). In the diagnostic field, award-winning research used near-infrared spectroscopy (NIRS) to detect *Schistosoma mansoni* infection in snails before cercariae release, potentially improving malacological surveillance (TREVISANO et al., 2024). Regarding the development of therapeutics, researchers identified 35 small molecules capable of binding to essential proteins of the parasite, pointing to promising avenues for new anti-schistosomal drugs (MENEZES et al., 2024).

Schistosomiasis has a direct impact on mortality. A recent ecological study in an endemic area of Brazil pointed to mortality attributable to the disease, showing that even in places with more consolidated control, there are deaths that require attention (de SOUZA et al., 2025). It is also worth mentioning that the COVID-19 pandemic affected health and surveillance policies in states such as Sergipe, influencing the monitoring of schistosomiasis and possibly causing underreporting or interruption of control programs (SANTOS et al., 2025).

II. DEVELOPMENT

Schistosomiasis is a neglected tropical disease caused by parasites of the genus *Schistosoma*, with a significant impact on vulnerable populations, associated with inadequate sanitation conditions, low access to health services, and poverty (MINISTRY OF HEALTH, 2023). Recent studies indicate that, despite advances in control programs, prevalence remains significant in some endemic regions of Brazil, especially in the Northeast and Southeast states, where transmission rates continue to demand more effective interventions (OLIVEIRA et al., 2025; Fiocruz, 2025).

One of the identified gaps is in relation to treatment in younger age groups: a clinical trial initiated by Fiocruz Bahia aims to evaluate the efficacy and safety of

praziquantel in children aged three months to six years, a range often understudied compared to older children. This study may provide important evidence to improve pediatric therapeutic recommendations. (FIOCRUZ BAHIA, 2025)

Furthermore, recent advances in understanding the interaction between the host's gut microbiota and schistosome infections suggest that the gut-liver axis plays a relevant role in disease progression, especially in the severity of liver lesions, which may open avenues for interventions that complement conventional treatment (UMAR et al., 2024).

Schistosomiasis is an infection caused by roundworms of the genus *Schistosoma*. Six species cause human infection: *S. mansoni*, *S. japonicum*, *S. mekongi*, *S. malayensis*, *S. haematobium*, and *S. intercalatum*. The first four parasitize vessels of the portal system, and their eggs are eliminated in the feces; *S. haematobium* preferentially parasitizes vessels of the bladder plexus, and its eggs are eliminated in the urine. *S. intercalatum* most frequently causes infection of the portal system, but can parasitize vessels of the bladder plexus. Occasionally, especially in cases of very intense parasitism and also in mixed infections, eggs of *Schistosoma* spp., a parasite of the portal system, can be found in the urine, and similarly, eggs of *S. haematobium* can be found in the feces. (NETO, 2008)

The first records of this disease were made in the Nile River basin in Africa and the Yangtze River basin in Asia. From these points of origin, it spread to other continents, following migratory flows. This spread was facilitated by the longevity of the adult worms, the high egg-laying capacity of the females, the existence of carriers eliminating eggs for many years, the chronic nature of the disease, and the wide distribution of intermediate hosts. (Pordeus, 2008)

Neves and colleagues (2001, apud Pordeus, Luciana Cavalcanti et al 2008) consider schistosomiasis to be an endemic disease in underdeveloped or developing countries. In Brazil, it is estimated that there are approximately six million infected individuals, mainly in the Northeastern states and Minas Gerais. Controlling schistosomiasis is one of the most difficult tasks for public health services. The importance of the disease is not limited to the persistence of its prevalence and wide geographical distribution worldwide. It also relates to the mollusk's escape mechanism from molluscicides, precarious housing and sanitation conditions, economic activities linked to water use – especially in rural areas –, the long time required for health education, and adherence to control programs. Furthermore, the lack of natural immunological defense mechanisms, as well as an effective vaccine, must be considered.

According to Neves and colleagues (2001, apud Pordeus, Luciana Cavalcanti et al 2008) , the transmission of schistosomiasis in Brazil depends on the presence of three snail species of the genus *Biomphalaria* : *B. glabrata* ; *B. tenagophila* ; and *B. straminea* . At least one of the three species has already been reported in 25 of the 27 federative units of the country. These mollusks are found in regions where there are freshwater bodies, such as dams, irrigation areas, rivers, lakes, lagoons, swamps, etc.

According to Favre and colleagues (2001, apud (Pordeus, Luciana Cavalcanti et al 2008)) , and in the numerous water bodies of the endemic area where human populations, for economic and sociocultural reasons, carry out a large part of their domestic, leisure and personal hygiene activities. The environmental conditions, associated with the lack of basic sanitation, such as sanitary sewage systems, water supply and treatment for consumption, as well as the intense movement of communities, create conditions conducive to the maintenance of transmission and the expansion of schistosomiasis.

The biological transmission cycle of schistosomiasis is described as follows. *S. mansoni* eggs are eliminated in the feces of the infected human host, and if the feces are released into freshwater bodies, they hatch, releasing a ciliated larva, called a miracidium, responsible for infecting the intermediate host. After four to six weeks, the larvae leave the snail and become free in the water as cercariae. If a person comes into contact with water infected by cercariae, these actively penetrate the skin and mucous membranes, causing the individual to acquire the infection. The worm develops in the human body for two to six weeks after the cercariae penetrate. After this period, the infected person can transmit the disease by eliminating *S. mansoni* eggs in their feces for many years. The worm, by itself, is not capable of inducing significant pathology in humans. However, the deposition of eggs in the liver and other organs is responsible for a vigorous granulomatous inflammatory response. Many infected individuals may remain asymptomatic, depending on the severity of the infection. In turn, clinical symptoms correlate with the stages of parasite development within the human body. (Pordeus, 2008)

Treatment for schistosomiasis is based on chemotherapy, which aims to eradicate adult worms. It is indicated in all parasitologically active cases, even in the most severe forms of the disease, since there may be involution, albeit partial, of liver abnormalities and portal hypertension. (NETO, 2008)

Currently, the drugs available for chemotherapy of schistosomiasis are praziquantel and oxamniquine. Cure

rates after single-dose treatment are similar for both drugs, but praziquantel has fewer adverse effects. Furthermore, this drug is effective against several species of *Schistosoma*, while oxamniquine is effective only against *S. mansoni*. (NETO, 2008)

The cure can be monitored by performing six stool tests at monthly intervals, with the first one done 45 to 60 days after treatment. (NETO, 2008)

The establishment of a basic sanitation network, consisting of systems for the treatment and supply of water to homes and the collection and treatment of household waste, although not exclusively intended to combat schistosomiasis but rather the range of waterborne diseases – of which schistosomiasis is one representative – would play a fundamental role in controlling this endemic disease. The lack of political will to invest in infrastructure projects, undoubtedly costly and with only long-term returns, holds the various levels of government responsible, despite the undeniable benefits for the population as a whole and, in particular, for the poorest segments. (NETO, 2008)

Schistosomiasis control should be considered from two approaches: transmission control or morbidity control. (Cimermam, 2008)

Controlling transmission aims to interrupt the parasite's life cycle, preventing new infections. This should be the priority when the goal is to definitively solve the problem and when political will and financial resources are available. Achieving this goal requires comprehensive measures such as basic sanitation, installation of water and sewage systems in homes, environmental changes, health education, snail control, and diagnosis and treatment of infected human cases. (Cimermam, 2008)

In controlling morbidity, the goal is to prevent the appearance of hepatosplenic forms. This is achieved through the diagnosis and treatment of infected human cases. (Cimermam, 2008) . Schistosomiasis mansoni continues to be a public health problem in Brazil, with heterogeneous distribution among states, municipalities, and communities, strongly related to socioeconomic, environmental, and access to basic sanitation factors.

According to Oliveira, Correia, Oliveira & Ribeiro (2025), between 2019 and 2023, **-13,575 cases of schistosomiasis** were reported in Brazil, with the highest concentration in the Northeast and Southeast regions, particularly in the states of Minas Gerais, Bahia, Pernambuco, Sergipe, and São Paulo. The prevalence during this period remained below 2 cases per 100,000 inhabitants, suggesting some improvement in the social and sanitary determinants of the disease.

In the state of Bahia, the panorama of hospitalizations due to schistosomiasis between 2019 and 2023 showed **1,557 hospitalized cases**, with the year 2023 accounting for **546 cases** (35.06%) of that total. The epidemiological profile of these cases indicated a predominance of males and an age range of 40-59 -years, in addition to the intestinal form of the disease being the most common.

In areas of lower endemicity, there are important changes in the epidemiological profile. For example, in a municipality in Alagoas, a cross-sectional study identified a prevalence of **30.5%** infection in 347 participants, with a risk approximately three times higher for people residing in urban areas compared to those in rural areas and for farmers, in addition to strong associations with poor drinking water conditions, sanitation, and the number of residents per household. Research in a quilombola community in the Northeast identified a prevalence of **15.69%** of the disease in a sample of 497 people and related infection to low levels of education, modest family income, inadequate sewage disposal, and contact with natural waters, highlighting the determining influence of social and environmental factors on the risk of infection.

Temporal trends are also observed: there are local variations in the increase or decrease of notifications according to control measures, with sanitation, health education, and epidemiological surveillance being critical components of risk modification. However, challenges persist in case detection, underreporting, delays in diagnosis, and failures in basic infrastructure that favor the maintenance of transmission. The life cycle of *Schistosoma mansoni* is complex and involves two main hosts: the definitive host, which is the human being, and the intermediate host, which are snails of the genus *Biomphalaria* (DIAS, 1998). The cycle begins when infected people eliminate parasite eggs in their feces. These eggs, upon reaching aquatic environments, hatch, releasing the miracidium larva, which has the ability to swim and penetrate suitable host snails. Inside the snail, the miracidium undergoes several transformations, giving rise to cercariae—bifurcated and mobile larval forms capable of infecting humans (PEREIRA & TÁVORA, 1994). The cercariae are released into the water and remain viable for about 48 hours, seeking contact with human skin. Infection occurs when the cercariae penetrate the skin, transforming into schistosomules, which migrate through the bloodstream to the liver, where they mature and become adult worms (MINISTRY OF HEALTH, 2005). The adult worms mate and migrate to the mesenteric veins of the intestine, where the females lay eggs. A portion of the eggs are eliminated in the feces, continuing the cycle, while another portion remains in the tissues, triggering the inflammatory response

and clinical manifestations of the disease (DIAS, 1998; PEREIRA & TÁVORA, 1994). Understanding the cycle is fundamental for the control of schistosomiasis, as it highlights critical points for interventions, such as basic sanitation to prevent water contamination, snail control, and protection of individuals against contact with contaminated water. The treatment of schistosomiasis mansoni is mainly based on the use of the drug praziquantel, considered the drug of choice due to its effectiveness against all clinical forms of the disease, good tolerability, and affordable cost (MINISTRY OF HEALTH, 2023). Praziquantel acts by promoting paralysis of adult worms, facilitating their elimination by the host's immune system (OLIVEIRA et al., 2025). Recent research seeks therapeutic alternatives for cases of drug resistance or intolerance, as well as formulations that can be applied to age groups that are still poorly studied, such as children under six years of age (FIOCRUZ, 2025). Experimental studies have identified compounds with antiparasitic potential, such as small molecules that interact with essential proteins of *Schistosoma mansoni*, aiming at the development of new drugs with greater efficacy and lower toxicity (MENEZES et al., 2024). The use of anti-inflammatory drugs and clinical support is recommended in cases of severe manifestations of the disease, such as hepatosplenic schistosomiasis, to control symptoms and prevent complications (SANTOS; LIMA, 2023). The administration of praziquantel in a single dose of 40 mg/kg is the most commonly used in mass treatment campaigns, although some protocols recommend divided doses for greater efficacy in more severe cases (MINISTRY OF HEALTH, 2023). Monitoring treatment and evaluating cure are important to prevent reinfections and ensure disease control in endemic areas (OLIVEIRA et al., 2025). Prevention of schistosomiasis mansoni involves integrated actions aimed at interrupting the transmission cycle, reducing human exposure to contaminated water and contact with the intermediate host, the *Biomphalaria snail* (MINISTRY OF HEALTH, 2023). Among the main preventive measures, the improvement of basic sanitation stands out, with the implementation of adequate systems for the supply of drinking water and sewage treatment, fundamental to avoid the contamination of water bodies by human feces containing parasite eggs (OLIVEIRA et al., 2025). Universal access to these infrastructures is directly associated with the reduction of disease prevalence in endemic areas (SANTOS; LIMA, 2023). Another important strategy is the environmental control of disease-carrying snails, through the application of molluscicides in strategic locations, mechanical removal of the mollusks, and environmental changes that prevent their reproduction (FIOCRUZ, 2025). However, these measures must be

adopted cautiously to minimize environmental impacts and mollusk resistance (MENEZES et al., 2024). Health education for the population in endemic areas is crucial to reduce risky behaviors, such as frequent and unprotected contact with contaminated natural waters for bathing, leisure, or work (MINISTRY OF HEALTH, 2023). Effective educational campaigns have demonstrated a significant impact on adherence to prevention practices, contributing to the sustainable control of the disease (OLIVEIRA et al., 2025). Furthermore, ongoing epidemiological and malacological surveillance allows for the identification of risk areas, monitoring of transmission, and guidance of rapid interventions, preventing the spread and reintroduction of schistosomiasis in regions where it has been controlled (LIMA et al., 2025). Thus, schistosomiasis prevention demands a multidisciplinary and intersectoral approach, integrating sanitation, environmental control, education, and surveillance to achieve effective and lasting results.

Tests to detect schistosomiasis

1. Parasitological examination of stool (Kato-Katz method)

- It is the gold standard test for diagnosing schistosomiasis.
- It consists of identifying *Schistosoma mansoni* eggs in feces.
- A quantitative method that also allows for estimating the intensity of the infection.
- Suitable for endemic areas and epidemiological surveillance.

2. Serological test

- Detects specific antibodies or antigens against *Schistosoma mansoni*.
- Useful in cases of low parasite load or in the early stages of the disease.
- It can be done by ELISA, immunofluorescence, or other immunological techniques.
- It does not differentiate between active infection and past infection (due to the persistence of antibodies).

3. Diagnosis by PCR (Polymerase Chain Reaction)

- Detects parasite DNA in biological samples (feces, urine, or blood).
- Highly sensitive and specific, useful for early diagnosis.

- Still not widely available in routine clinical practice due to its cost and complexity.

4. Urine test

- Less common for *S. mansoni* (more commonly used for *Schistosoma haematobium*).
- It can be used for antigen testing or PCR in some situations.

5. Imaging exams

- Abdominal ultrasound: evaluates changes in the liver and spleen caused by chronic schistosomiasis.
- It doesn't detect the parasite, but it helps in staging the disease.

6. Circulating Antigen Test (CCA)

- Detects circulating *Schistosoma* antigen in stool or urine.
- It can be used in the field, with quick results.
- Useful for diagnosis in areas of low endemicity.

III. METHODOLOGY

The methodology used to support this qualitative study consists of a literature review through bibliographic research. The theoretical framework that fueled my reflections, questions, and investigations was constructed from reading, studying, and collecting records from books, magazines, newspapers, the internet, and news reports dealing with the subject. By bringing together theoretical elements from different perspectives, I consolidated my intentions in the proposed study on Schistosomiasis.

IV. FINAL CONSIDERATIONS

Schistosomiasis *mansoni* is an endemic disease in underdeveloped and developing countries, representing a serious public health problem. It is estimated that the disease is present in 74 countries, affecting approximately 200 million infected people and putting about 600 million at risk globally (WHO, 2024). In Brazil, approximately six million individuals are infected, with the highest concentration in the Northeast region and the state of Minas Gerais (MINISTRY OF HEALTH, 2023).

Controlling schistosomiasis represents one of the greatest challenges for public health systems, given its high incidence, the complexity of its transmission cycle, and the socio-environmental conditions that perpetuate the disease. In this sense, the present study is of fundamental

importance, as it contributes to the identification of risk factors associated with schistosomiasis transmission, in addition to relating them to effective prevention and treatment strategies.

The abundant presence of water bodies in endemic areas, coupled with the economic and sociocultural activities of local populations who use these waters for hygiene, leisure, and other domestic activities, favors the maintenance of transmission. Poor environmental conditions, especially the absence or insufficiency of basic sanitation—such as adequate sewage systems, water supply, and treatment—combined with intense population mobility, are determining factors for the persistence and expansion of the disease (OLIVEIRA et al., 2025; SANTOS; LIMA, 2023).

Given this scenario, the implementation of integrated actions involving improvements in basic sanitation, environmental control of disease-carrying snails, health education, and epidemiological surveillance becomes essential for the effective reduction of schistosomiasis prevalence. Furthermore, strengthening public policies focused on the health of vulnerable populations is fundamental to mitigating the social and economic impacts resulting from the disease.

The fight against schistosomiasis requires a continuous commitment from managers, health professionals, and communities, aiming not only at treating existing cases but, above all, at preventing transmission and promoting environmental and social health in affected areas.

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